of different database designs, our system is able to export patient information to the unique format as XML document. Also, the scalability of database is improved by allowing multi-transactions to exist with a high level of parallelism.
CONCLUSION: The heart failure database in DHMC provides clinicians an efficient method for digital data collection, automatic information retrieval and remote data sharing. However, data safety and patient privacy are not sacrificed. Through our work with the information security board at DHMC, we list 19 features as patient-traceable information. Our work is one of the starting steps for the hospital to build a HIPAA compliant multi-center database.

1020-72 Identification of Electrocardiogram Characteristic Points: Wavelet Transform Versus Derivative-Based Method

Hoi Fei Kwok, Andrea Giorgi, Riccardo Fenici, Antonino Raffone, University of Sunderland, Sunderland, United Kingdom, Catholic University of Sacred Heart, Rome, Italy

Background: ECG is an important tool in the diagnosis of ischemic heart disease and arrhythmia. Computerized automatic diagnostic tools may help clinicians in diagnosing these diseases and give early warning when the ECG is continuously monitored. Their success depends on the availability of reliable ECG wave identification systems. The conventional algorithms include the use of derivative-based methods and non-linear filtering. In the past decades, the wavelet transform has been advocated. Although investigators [1] have compared the performance of wavelet transform with the conventional algorithms on QRS detection, research is still needed on the performance of these algorithms on P and T wave detection. In this study, we compared the accuracy of a derivative-based method and the wavelet transform in P, R and T wave detection.
Methods: ECG signals were downloaded from 48 files of the European ST-T database. We extracted 11 one-minute recordings to cover a variety of ECG morphologies. The signals were filtered by a bandpass filter. The derivative-based method identified the ECG waves by applying rules on the smoothed differentiated signal. For the wavelet transform, the first derivative of a Gaussian was used as the basis function. The number of P, R and T waves correctly identified by the derivative-based method and the wavelet transform were compared.
Results: 806 ECG beats were analyzed. 89.4% of the P waves were identified correctly using wavelet (compared to 80.2% for the derivative-based method). The lack of statistical significance (p=0.07) may be due to a lack of power. 99.0% of R waves were identified correctly using wavelet compared to 98.8% for the derivative-based method. 91.8 % of the T waves were correctly identified using wavelet compared to 77.3% for the derivative-based method ($p<0.05$).
Conclusion: The wavelet-based method was shown to be superior to the conventional derivative-based method especially in T wave identification.
Reference:
[1] Kadambe S, Murray R, Boudreaux-Bartels GF, 'Wavelet transform-based QRS complex detector', IEEE Transactions on Biomedical Engineering, 1999 July, 46(7): 838-848.

1020-73 Veterans Information Systems & Technology Architecture-Computerized Patient Record System (CPRS-VistA) Provides an Accurate and Feasible Means for Remote Interpretion and Widespread Access to Cine Echocardiographic Image Data Within the Veterans Affairs Healthcare System

Michael D. Greenberg, Ross Fletcher, Ismat Pervin, Tokzhan Clay, Devika Hanumara, Peter Kokkinos, Chiao Wu, Erin Goheen, Vivek Bahl, Washington DC Veterens Affairs Medical Center, Washington, DC

Background: CPRS-VistA is the electronic medical record (EMR) and imaging platform employed at Veterans Affairs (VA) hospitals. The system allows access patient data as well as dicom images. We sought to establish the accuracy and feasibility of incorporating cine, echocadiographic images into the EMR for remote viewing and interpretation of studies by all clinicians from multiple sites throughout the VA hospital **Methods:** echoardiograms were digitally acquired using an Agilent (sonos, 5500) system from 35 patients (57 ± 16 years; known CAD 22%; hypertension 44%; lung disease 12%). Dicom image files were exported to the hospital EMR in AVI and BMP format with representative cine images and still frames and were viewable on the hospital network from 1700 client workstations. Each study was interpreted by the same reader both in the conventional fashion, at the dedicated echo reading station as well as remotely on the hospital netowork from different client workstation. **Results:** cine echo images were fully viewable from any of the 1700 client workstations throughout the hospital. Mean study size was 31(± 8 MB) with dowload time of < 5 seconds (90% cases). There was excellent concordance and no significant difference with respect to interpretation of key echoardiographic parameters. **Conclusion:** The VA CPRS-VistA electronic record allows for accurate, widespread and remote interpretation and viewing of echocardiographic data with diagnostic accuracy equivalent to conventioanl means of echo reading.

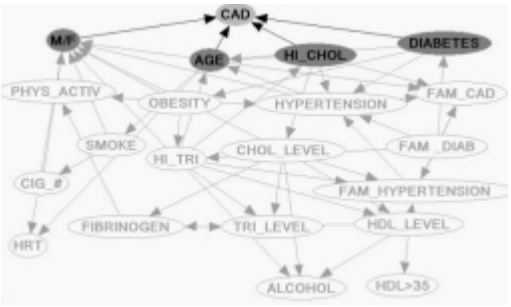
Echocardiographic Data Interpretation

	Reading Station	CPRS-VistA	p Value
Ejection Fraction (%)	44 ± 13	46 ± 11	ns
Left Atrial (mm)	39 ± 5	39 ± 5	ns
Septum	13 ± 4	13 ± 4	ns
Inferior	12.4 ± 2	12.4 ± 2	ns
Mitral Regurgitation (%) none mild-moderate severe	 34 80 6	 34 80 6	ns
Aortic Stenosis none moderate-severe	 97 3	 97 3	ns
Tricuspid Regurgitation (%) none mild- moderate severe	 69 20 4	 75 14 11	ns
Pericardial Effusion (%) present absent	3 97	3 97	ns
* septum, inferior wall, LA from transfer of still image with measurements			

1020-74 A Bayesian Network to Evaluate Risk Factors Profiles in Patients With Coronary Artery Disease

Domenico Cianflone, Marco Magnoni, Stefano Coli, Alice Calabrese, Gaetano A. Lanza, Antonio Rebuzzi, Filippo Crea, Università Vita Salute San Raffaele, Milano, Italy, Università Cattolica del Sacro Cuore, Roma, Italy

Background: Bayesian neural networks (BNN) are computational models for encoding probabilistic inferences among variables of interest. BNN encode dependencies among all variables, learn from actual data to evaluate causal and probabilistic relationships in a complex setting. We developed a BNN for evaluating the risk factor profiles and the dependencies among the various risk factors and their relations to the presence and to the extent of coronary artery disease (CAD) at angiography.
Method: We fed a BNN development tool (MS-Research) with the XML-formatted data from the electronic records of risk factor profiles and coronary angiography of 5180 patients (3878M; age 62; 54-68; median 25°-75° percentile). Data were randomly divided in training and testing data sets in a 70/30 proportion.
Results: We obtained a Bayesian graphical "node-relationship" model (see below) that calculated the casual and probabilistic dependencies among risk factors and towards the result of the coronary angiography, (normal, vs. 1-, 2- and 3- vessels disease). The model can be queried for any node/variable to explore the dependencies and its predictive value towards other variables. The model also provides probabilistic decision tree for each node/variable and its related nodes to help evaluating the probability of the presence and extent of CAD.
Conclusion: BNN are useful for the analysis of large clinical datasets. BNN can provide a teaching and evaluation tool for estimating the determinants of outcome from clinical data.



Special Topics